In the Claims

1. (currently amended) A method for modeling ~~an object~~ a moving object composed of one or more components, comprising:

inputting data for each component of the object, the data including coordinates expressed in Euclidean space for a plurality of points **x** of each component;

encoding, for each component, each point **x** as a null vector x in a homogeneous space by $x = (\mathbf{x} + \frac{1}{2}\mathbf{x}^2 e + e_*)E = \mathbf{x}E - \frac{1}{2}\mathbf{x}^2 e + e_*$, where e and e_* are null vectors of with unit bivector $E = e \wedge e$; ~~and~~

associating a plurality of general homogeneous operators with each ~~data construct~~ component to generate a model of the object; and

determining a motion of the object by a time dependent displacement versor $D=D(t)$ satisfying a differential equation $\dot{D} = \frac{1}{2}VD$, with "screw velocity" V given by $V = -I\omega + e\mathbf{v}$, where ω is a velocity and $\mathbf{v}$ is a rotational translational velocity of the object, wherein the object is a rigid body.

2. (original) The method of claim 1 further comprising:

supplying run-time parameters for the plurality of operators; and

applying the plurality of general homogeneous operators to each encoded point **x** of each associated component to manipulate the model of the object.

3. (previously amended) The method of claim 1 further comprising:

measuring a scalar distance $\mathbf{d_{ab}}$ between two component points **a** and **b** encoded as homogeneous points a and b by $\mathbf{d_{ab}}^2 = (a - b)^2 = -2a\bullet b$.

4. (previously amended) The method of claim 1 wherein a line through component points **a** and **b** encoded as homogeneous points a and b is modeled by $e \wedge a \wedge b$, and a length $\mathbf{l_{ab}}$ of a line segment connecting component points **a** and **b** is generated by:

$$(\mathbf{l_{ab}})^2 = (e \wedge a \wedge b)^2 = (a - b)^2.$$

5. (previously amended) The method of claim 1 wherein a plane through component points **a**, **b**, and **c** encoded as homogeneous points a, b, and c is modeled by $e \wedge a \wedge b \wedge c$, and an area $\mathrm{A_{\mathbf{abc}}}$ is generated by $(\mathrm{A_{\mathbf{abc}}})^2 = \frac{1}{4}(e \wedge a \wedge b \wedge c)^2$.

6. (previously amended) The method of claim 1 wherein a sphere **s** with radius **r** centered at a component point **c** encoded as homogeneous point c is encoded as a vector $\mathbf{s} = c + \frac{1}{2} r^2 e$.

7. (previously amended) The method of claim 1 wherein a sphere **s** determined by four component points **a, b, c, d** encoded as homogeneous points a,b,c,d is generated by $s = (a \wedge b \wedge c)(a \wedge b \wedge c \wedge e)^{-1}$.

8. (currently amended) The method of claim <u>8 wherein</u> a plane through component points a,b,c is encoded as a vector $p = I(a \wedge b \wedge c \wedge e)|a \wedge b \wedge c \wedge e|^{-1}$, where I is a unit pseudoscalar.

9. (previously amended) The method of claim 8 wherein a distance between a component homogeneous point **a** and a component plane **p** is generated by an inner product $a \bullet p$.

10. (previously amended) The method of claim 6 wherein a distances between a homogeneous component point **a** and a component sphere **s** is generated by an inner product $a \cdot s$.

11. (previously amended) The method of claim 6 wherein a distance between two component spheres $s_1 = c_1 + \frac{1}{2} r_1^2 e$ and $s_2 = c_2 + \frac{1}{2} r_2^2 e$ is generated by $s_1 \cdot s_2 = c_1 \cdot c_2 + \frac{1}{2}(r_1^2 + r_2^2) = \frac{1}{2}[(r_1^2 + r_2^2) - (c_1 - c_2)^2]$.

12. (cancelled)

13. (previously amended) The method of claim 12 wherein dynamics of the rigid body are determined by a differential equation $\dot{P} = W$, where $P = -I\mathbf{L} + e_* \mathbf{p}$, and $W = -I\mathbf{T} + e_* \mathbf{F}$, where **L** is an angular momentum and **p** is a translational momentum of the rigid body, while **T** is a net torque and **F** is a net force on the rigid body.

14. (previously amended) The method of claim 12 wherein the rigid body includes n linked rigid components, and a motion of the rigid body is modeled by n time dependent displacement versors $D_1, D_2, \ldots, D_n$, with a motion of a k^{th} linked rigid component determined by a versor product $D_1 D_2 \ldots D_k$.

15. (previously amended) The method of claim 1 wherein the objects is a robot composed of a plurality of rigid bodies connected at joints.